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# USDA updates nutrient values for fast food pizza

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#### **Abstract**

Consumption of quick service pizza has increased as Americans are spending more on food away from home. Pizza is consistently a primary Key Food in the USDA National Food and Nutrient Analysis Program (NFNAP) because it is a contributor of more than 14 nutrients of public health significance to the U.S. diet. The USDA Nutrient Data Laboratory collected national samples of the two leading fast food pizza chains to monitor and update changes in this popular food. Two brands of pizza - cheese (regular, thick, and thin crust) and pepperoni (regular and thick crust) pizzas were collected in 12 nationwide locations in 2003 and again in 2010. Sample units of pizzas were prepared for analysis of proximates, vitamins, minerals and fatty acids using NFNAP protocols. Analytical samples and quality control materials were analyzed by USDA-qualified laboratories using Association of Official Analytical Chemists (AOAC) approved methods. Nutrient data were statistically evaluated (significance set at p<0.05) to compare similar pizzas from different years. Based on these analyses, values for various nutrients changed. For example, both brands of cheese, thin crust pizzas showed a significant increase in sodium (p<0.014). Across all pizza types, brand A pizzas showed a significant increase in iron (p<0.0009-0.036) and potassium (p<0.001-0.013). Total sugars, fiber, cholesterol, and fat values significantly increased or decreased by brand and pizza type. These analyses provide current, accurate, nationally representative data for high consumption foods in the U.S. and are included in the USDA Nutrient Database for Standard Reference 24 as part of an effort to monitor changes in nutrient profiles for popular foods.

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# 1. Introduction

Consumption of foods away from home accounts for over 50% of total food eaten in the United States, with full-service and fast food restaurants accounting for 77% of all food away from home sales [1]. Sales of fast food pizza have increased from \$28 billion in 2000 to over \$35 billion in 2010 and continue

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to rise [2]. The USDA Nutrient Data Laboratory (NDL) recognized pizza as a high consumption food and sampled popular types of fast food pizza from the top two national pizza chains in 2003 and again in 2010 as part of their nutrient monitoring program. The two leading fast food pizza chains accounted for over 47% of the market-share based on the sales of the top 50 U.S. pizzerias [2] and had nearly \$9 billion in sales in the United States during 2011[3]. Pizza is consistently a Key Food in the USDA National Food and Nutrient Analysis Program (NFNAP) because it is a contributor of more than 14 nutrients of public health significance in the American diet, including total fat, calcium and sodium. Sodium is an essential nutrient, where nearly all Americans consume more than the Tolerable Upper Intake Level of 2.300mg per day for adolescents and adults 14 years and older [4]. Pizza is estimated to contribute 6.3% of sodium in the diet of the U.S. population due to both frequent consumption and higher levels of sodium [5]. The National Salt Reduction Initiative (NSRI), a collaborative effort among government agencies, food industry and health organizations to reduce the sodium in processed/prepared and restaurant foods, has set a goal to reduce sodium in these foods by 25 percent by 2014 [6]. While some fast food companies have pledged to reduce sodium in their products as part of the NSRI, other companies, such as the two brands sampled in this study, have not publicly made a commitment. As funding permits, NDL will continue to monitor sodium and other nutrients of public health concern in fast food pizza. The objective of this study was to compare similar fast food pizzas from 2003 to 2010, to determine the changes, if any, in this high consumption food.

#### 2. Material and Methods

# 2.1 Samples

During the summer of 2003, sample units of cheese (regular, thick, and thin crust) and pepperoni (regular and thick crust) pizzas were collected from the top two national fast food pizza chains in 12 statistically selected locations in the 48 conterminous states. The fast food pizza chain locations were indentified using a multistage, stratified sampling plan developed for NFNAP [7]. Samples of both leading brands were again collected in October 2010. Sample units of the same types of fast food pizzas were collected from the pizza chains in the same statistically selected locations. Specialized protocols were followed to handle and ship sample pizza units to the Food Analysis Laboratory Control Center at Virginia Polytechnic Institute [8].

# 2.2 Analyses

The sample units in 2003 were analyzed by individual locations (n=12) except for thin crust cheese (both brands), thick crust cheese (brand B) and thick crust pepperoni (brand B). These sample units were randomly grouped into 4 subgroups of 3 locations each and composited for analysis. In 2010, sample units were randomly grouped by brand into 6 subgroups of 2 locations each and composited to create a final analytical sample. All samples were composited according to previously developed protocols for NFNAP. Values for proximates, vitamins, minerals and fatty acids were determined by NDL-approved commercial laboratories using validated Association of Official Analytical Chemists (AOAC) methodology.

# 2.2. Quality Control

Analytical quality control assurance was monitored through the use of appropriate standard reference materials and in-house control materials.

# 2.4 Statistics

Nutrient values were statistically evaluated using Wilcoxon Rank Sum Test with significance set at p<0.05 to compare similar pizzas from different years.

#### 3. Results and Discussion

#### 3.1. Sodium

From 2003 to 2010, sodium significantly increased in both brands of cheese pizzas with thin crust; brand A mean increased from 783 to 857mg/100g (p<0.014); and brand B mean increased from 558 to 628mg/100g (p<0.014) (Table 1). Non-significant increases in sodium were found in brand A cheese pizza with regular crust (632 to 674mg/100g p<0.055) and in cheese pizza with thick crust (555 to 580mg/100g p<0.099) (Table 1)and in brand B cheese pizza with regular crust (479 to 523mg/100g p<0.174) and cheese with thick crust (607 to 615mg/100g p<0.915). For pepperoni pizza, by brand and by crust types, there were no significant changes in sodium (Table 1). The significant increase in sodium in both brands of cheese pizza with thin crust was inadvertent and possibly due to other variables such as spec changes and/ or pizza preparation methods, as reported by the manufacturer.

Table 1.Sodium, iron and potassium by crust type in cheese and pepperoni pizzas for 2003 and 2010

	Crust type	Sodium mg/100g			Iron mg/100g			Potassium mg/100g		
		2003	2010	p-value	2003	2010	p-value	2003	2010	p-value
Brand A										
Cheese Pizza	Regular	632	674	0.055	1.93	2.62	0.001*	158	183	0.009*
	Thin	783	857	0.014*	1.45	2.52	0.036*	178	197	0.013*
	Thick	555	580	0.099	1.62	2.48	0.001*	147	170	0.013*
Pepperoni Pizza	Regular	744	759	0.281	2.13	2.71	0.001*	184	207	0.001*
	Thick	668	676	0.815	1.65	2.57	0.001*	163	187	0.006*
Brand B										
Cheese Pizza	Regular	479	523	0.174	2.34	2.34	0.880	152	161	0.313
	Thin	558	628	0.014*	0.71	0.91	0.014*	184	202	0.133
	Thick	607	615	0.915	2.96	2.50	0.025*	163	168	0.336
Pepperoni Pizza	Regular	596	611	0.915	2.36	2.33	0.610	169	182	0.336
	Thick	692	693	0.999	2.59	2.54	0.592	176	190	0.165

<sup>\*</sup>indicates significantly different (p<0.05)

## 3.2. Iron

Iron significantly increased from 2003 to 2010 in brand A cheese pizza, all crusts: regular crust mean increased from 1.93 to 2.62mg/100g (p<0.001); thin crust mean increased from 1.45 to 2.52mg/100g (p<0.036); and thick crust mean increased 1.62 to 2.48mg/100g (p<0.001) (Table 1). Brand B cheese pizza was variable in iron content by crust-type. Iron in brand B thin crust cheese pizza significantly increased from 0.71 to 0.91mg/100g (p<0.014) and significantly decreased in thick crust cheese pizza from 2.96 to 2.50mg/100g (p<0.025). In pepperoni pizza, iron significantly increased in both types of crust in brand A: regular crust mean iron increased from 2.13 to 2.71mg/100g (p<0.001); and thick crust mean increased from 1.65 to 2.57mg/100g (p<0.001). Brand B pepperoni pizza did not significantly

change for either regular crust (2.36 to 2.33mg/100g p<0.610) or thick crust (2.59 to 2.54mg/100g p<0.592) (Table 1).

Iron is a nutrient of public health concern for specific populations such as women who may become pregnant and adolescent girls [6]. Iron (ferrous sulfate) is an added nutrient in the enriched flour that is used as an ingredient in all types of crust for both brands, except Brand B thin crust pizza which uses non-enriched flour. Brand A iron significantly increased in both pizzas and in all pizza types, which used enriched flour as an ingredient for all types of crust in 2003 and 2010. The manufacturer reported this increase was not an intentional increase and may be as a result of year-to-year specification changes.

# 3.3. Potassium

Potassium significantly increased in brand A cheese and pepperoni pizza for all crust types from 2003 to 2010; cheese regular crust from 158 to 183 mg/100 g (p<0.009), thin crust 178 to 197 mg/100 g (p<0.013), thick crust from 147 to 170 mg/100 g (p<0.013); and pepperoni regular crust from 184 to 207 mg/100 g (p<0.001) and thick crust from 163 to 187 mg/100 g (p<0.006). There were no significant differences in potassium in brand B from 2003 to 2010 in all crust types of both cheese and pepperoni pizzas (Table 1).

Potassium intake by Americans is low enough to make it a nutrient of public health concern. The benefit of dietary potassium is that it can lower blood pressure by reducing the undesirable effects of sodium [4]. Possible reasons why potassium significantly increased in Brand A pizzas is the addition of potassium as a dough conditioner (potassium iodate) or a preservative (potassium sorbate) in the crust. Brand B may have also included potassium in the crust as a dough conditioner or a preservative; however this did not result in a significant increase.

# 3.4. Other Nutrients

From 2003 to 2010, total fat significantly increased in brand A pepperoni pizza, regular crust (12.0 to 12.6g/100g p< 0.044) and in brand B cheese pizza, regular crust (8.39 to 8.97g/100g p<0.024). There was a significant decrease in total fat in brand B cheese pizza, thin crust (16.8 to 15.1g/100g (p<0.025) (Table 2). For the remaining pizza types, total fat did not differ significantly (Table 2).

Cholesterol significantly decreased in 3 types of brand A pizza; cheese pizza, regular crust (25.7 to 17.7 mg/100g p<0.012), cheese pizza, thick crust (28.2 to 18.6mg/100g p<0.012), and pepperoni pizza, thick crust (32.5 to 23.5 mg/100g p<0.012) (Table 2). There were no significant differences in calcium from 2003 to 2010 in both brands of cheese and pepperoni, in all crust types, except for a significant increase in brand A pepperoni pizza, regular crust (139 to 166mg/100g p<0.013) (Table 2).

Table 2. Total fat, calcium and cholesterol by crust type in cheese and pepperoni pizzas in 2003 and 2010

	Crust type	Total Fat g/100g			Cholesterol mg/100g			Calcium mg/100g		
		2003	2010	p-value	2003	2010	p-value	2003	2010	p-value
Brand A										
Cheese Pizza	Regular	10.9	10.4	0.362	25.7	17.7	0.012*	189	209	0.223
	Thin	13.3	12.8	0.756	40.8	29.7	0.052	263	284	0.336
	Thick	12.4	11.3	0.083	28.2	18.6	0.012*	187	192	0.962
Pepperoni Pizza	Regular	12.0	12.6	0.044*	29.2	25.8	0.220	139	166	0.013*
	Thick	14.4	13.1	0.055	32.5	23.5	0.012*	140	147	0.220
Brand B										
Cheese Pizza	Regular	8.39	8.97	0.024*	17.7	17.0	0.999	134	167	0.087
	Thin	16.8	15.1	0.025*	31.7	26.9	0.216	279	292	0.241
	Thick	10.3	9.83	0.163	18.8	16.3	0.216	148	166	0.165
Pepperoni Pizza	Regular	10.9	11.1	0.163	25.7	24.6	0.216	122	141	0.165
	Thick	12.3	12.1	0.915	24.7	24.2	0.860	138	149	0.392

<sup>\*</sup>indicates significantly different (p< 0.05)

#### 4. Conclusion

Pizza is a contributor of numerous nutrients of public health significance and is consistently a primary Key Food in the USDA NFNAP because of its high consumption in the U.S. diet. Several nutrients in this high consumption item have significantly differed from 2003 to 2010, while others remain constant or not significantly different. These observations provide updated values for nutrient monitoring in several types of high consumption fast food pizzas and current, accurate data on fast food pizza for USDA databases which serve as the source for nutrient analysis of dietary monitoring surveys [9]. As funding permits, more fast food pizzas will be sampled and analyzed for future monitoring, focusing on the nutrients of public health concern.

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